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(71) Applicant:
BASF Magnetics GmbH, 68165 Mannheim, DE

(72) Inventor:
Mannaberg, Frank, Dipl-Ing., 8038 Gröbenzell, DE

(54) Sealing configuration at the entrance and exit of a treatment line for web goods

(57) A leak-free airlock at the entrance and/or exit of a treatment line for web goods is described, where the web good (1) consists of a carrier material and, for example, of a dispersion that has been applied onto the web, where the dispersion contains a volatile solvent. After leaving the treatment line of a dryer through an airlock the web good then goes over hollow suction devices on both web sides, said hollow suction devices remove residual gas that persist in the two surfaces and returns it to the process gas-system of the dryer. The hollow suction devices, which are inherently known, are equipped on both front sides with sealer wedges (17). The dryer airlock (9) is purged with inert gas (Figure).

Description

The invention relates to a sealing configuration at the entrance and/or exit of a treatment line for continuous web goods, said web goods consist of a flexible carrier material and optionally a coating that has been applied onto of the carrier.

These type of sealing configurations that function as web airlocks are necessary for lines where the web runs through various zones and the various gas environments should not be mixed together or in which different pressure levels should be maintained. This is, for example, the case for dryers in which solvent-containing liquids from dispersions are evaporated, furthermore for ozone-producing corona-treaters, vacuum coating equipment and similar units.

The gas exchange between two zones through an airlock takes place essentially by the known pressure difference between the two zones and the conveying function of the continuously moving web good. The web good conveys gas in that a thin gas layer adheres to both outer surfaces of the web. The resulting volume of transferred gas depends mainly on the roughness of the web surface and the line speed of the web.

Typical airlocks that are designed as a narrow gap between the line parts do not function as the best seals, because the gap surface has to be chosen to be relatively large. Thus, the gap cannot go below a certain height, because the web would hit the gap lips where there are folds and high points in the web good, just as for the passage of bonding spots, hitting the gap lips can lead to the web's damage for sensitive webs. The gap has to also have a larger width than the web width, because the web would contact the side when it moves in a transverse direction to the machine direction. A reduction in the adhering gas boundary layer has only a very small effect on the gap air lock.

From the state of the art it is known that for drying coated web goods of the general type mentioned above that a heated drying process gas, which also purges the web good, is blown on the web, where the dry atmosphere is loaded with the vapors and harmful substances that have been liberated from the treating agent. In order to combat the exit of this type of atmosphere from the dryer into the surroundings, in particular through its slit-shaped exit, it is typical to operate the dryer at reduced pressure. Because it is known through experience that this measure alone does not suffice, it is known to place blowing nozzles on both sides of the web good at the slit-shaped exit, said blowing nozzles rake the web good on both sides. In this manner an escape of the dryer atmosphere into the surroundings can be prevented, however, it cannot prevent the escape of solvent-loaded vapors from the hot web good that is leaving the dryer in the area between the dryer and a roll for the web good that is placed with a separation from the dryer.

Furthermore, it is known to place at the dryer exit configurations for drawing off the process gas that is loaded with solvent via suction. It is also known to border the entrance and/or exit of dryers with seal mats or lamellae-shaped seals such that no process gas that is loaded with solvent can escape into the exterior space areas.

This is especially important, if one is dealing with organic solvents that are damaging to the environment or are explosive. The above mentioned configurations are known, for example, from the patents DE 27 16 613, DE 36 33 434, US 4, 575, 952 and EP 0 341 646.

Experiments by the applicant have shown that configurations according to the previously mentioned state of the art cannot effectively prevent process gas loaded with aggressive, very volatile solvent from escaping into the outer atmosphere and thus can be harmful for the operators or can lead to an explosion danger. When using solvents that have an explosion danger it is not only necessary to enclose these solvents in a closed system, but on the other hand, no oxygen shall also penetrate into the system, because otherwise a gas mixture that is capable of exploding can form in the system.

For such an application case the use of the airlock also at the entrance for a system to be closed up is useful, as it is described in the German application file number 42 36 299 from the same applicant.

This configuration consists of several chambers that have different pressures for drawing off residual solvent and feeding this back into the process gas, and correspondingly, for purging with purified process gas, or correspondingly, inert gas and where the pressure ratios of the chambers are chosen such that only small amounts of residual process gas can get into the neighboring chambers.

The objective of the present invention was to find a sealing configuration that functions as an airlock for moving material webs, where in said configuration the transfer of substances, just as leaks between two zones are significantly reduced.

In an inventive manner the objective was solved with a configuration of the above-mentioned general type with the features mentioned in the identifying part of claim 1. Other details of the invention come forth from the dependent claims, the description, just as from the drawing.

The inventive idea is represented in the application as an airlock for the exit of a dryer in which the liquid solvent from the coating that has been applied onto a carrier material has been removed. In the dryer exit airlock (9), which will be described subsequently in more detail, are located two known hollow suction devices that are configured as rolls (2, 3), said suction devices are placed one after the other and the surfaces of both web sides are freed via reduced pressure suctioning, one side after the other, from the process gas that sticks to the surfaces.

The web good (1), which comes out of a dryer configuration (16) that is not represented closer and that is purged with drying process gas, enters into the dryer airlock (9) through an entrance roll airlock, which for example can consist of a roll (5) that is placed in a rotatable manner and of sealing edges (7, 15) that are separated from the top, and correspondingly, from the bottom of the roll. The dryer airlock is purged with inert gas through an inlet-opening (8), where the excess inert gas is drawn off through suctioning zones (10, 10'). The web good (1) runs then, as represented, preferably with its coated top side (12) over a hollow suction roll device (2), as is already known from the state of the art, for example from the European patent EP 0 017 884 or preferably from the German patent application DE 40 03 927. In the latter application is described a hollow suction device made out of two

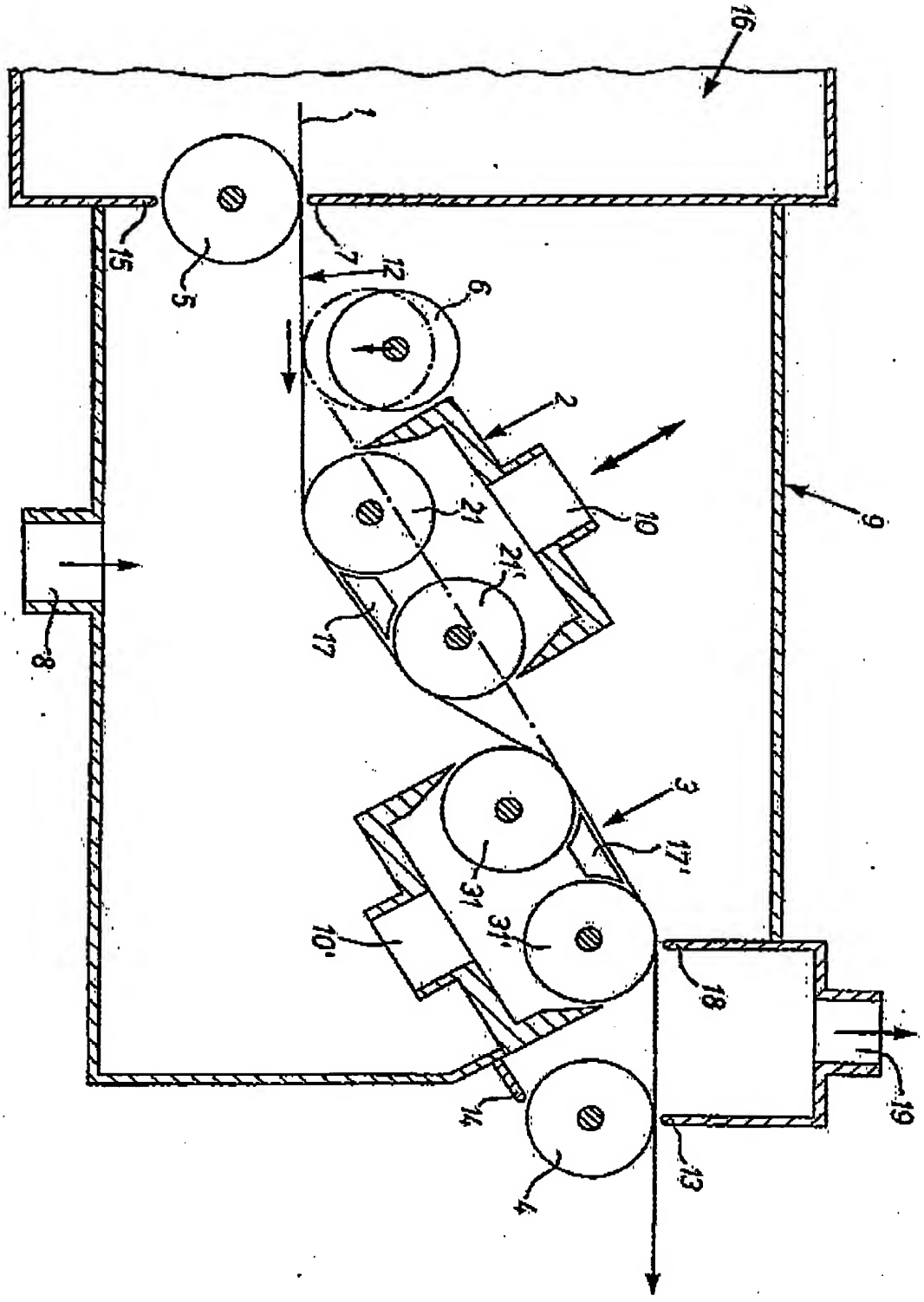
rolls, said device is run under reduced pressure such that the web is pulled into the inner space between the two rolls, such that it can be insured that the web can be feed well in this manner. Between the two rolls are located, on both outer edges of the web good, sealing wedges (17) that grab under the web edges and that cause only a minimal amount of gas to be sucked into the hollow suction device from the front sides. Subsequently, the web good runs over a correspondingly built hollow suction device (3) with its back side, said hollow suction device is also operated under reduced pressure, consists of two rolls (31, 31'), just as of sealing wedges (17') that are arranged between the two rolls on both sides. Subsequently, the web leaves the dryer airlock through a roll exit airlock, which is formed from the hollow suction roll (31') and from the sealing edge (18) and serves to reduce the inert gas use of the airlock (9). Following this, another roll exit airlock can be arranged, which is constructed analogously to the roll entrance airlock and consists of a roll (4), just as two sealing edges (13, 14). The small amount of gas that still escapes through the airlock (31', 18) can be drawn off through the opening (19). The gas sucked off from the hollow suction devices (2, 3) through the suction openings (10, 10') can be feed, for example, to the process gas in the dryer (16).

When starting the described line there exists a danger of contaminating the hollow suction roll devices (21, 21') that see the coating side of the web. In order to prevent this contamination a roll (6) that can be swung into the web path is placed in front of the first hollow suction device (2) and at the same time the hollow suction device (2) is designed to be able to be shifted. During the continuous operation the web path of the web good (1) is extended, as represented in the figure, the roll (6) is then moved upwards. For the starting process, just as for the passage of an adhesive spot of the web good, the roll (6) is located during a roll change in the lower position represented by the dash-dot line, while the hollow suction device (2) is swung away from the web good such that the web path, represented by the dash-dot line, is generated.

Through the represented sealing configuration a leak-free dryer exit airlock is obtained, the environmental impact is reduced to a minimum, as already explained, through the two hollow suction devices (2, 3) that suck off the residual gas content that persist on the boundary layers of the web good surfaces and that send back this residual gas to the dryer's process gas system.

Claims

1. Sealing configuration at the entrance and/or exit of a treatment line for moving web goods that consists of a flexible carrier material and optionally of a coating that has been applied on top of the carrier is characterized in that the web good (1) is fed before or after the treatment line (16) through an airlock (5, 7, 15) then over already known hollow suction devices (2, 3) on both web sides for drawing off the boundary layer that sticks to both surfaces, where the hollow suction devices are located in a chamber (9) that is purged with inert gas and where the gas that is sucked off by the hollow suction devices (2, 3) can be fed back to a process gas cycle through suction channels (10, 10') and where the web good (1) exits the chamber (9) through another airlock (4, 13, 14).
2. Sealing configuration according to claim 1 is characterized in that the hollow suction devices (2, 3) that consist of two rolls, each contain sealing wedges (17, 17') on both web edges between the rolls, said wedges grab under the webs.
3. Sealing configuration according to the claims 1 and 2 is characterized in that for a web good (1) that has been equipped with a coating (12) the hollow suction device (2), which draws off substances from the coated web side, can be swung back and that there exists another roll (6) that is located in front of the hollow suction device, where said roll can be swung in for guiding the web good (1) when the hollow suction device (2) is swung back.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